

A REDEFINITION OF THE GENUS TERATOPHYLLUM

By R. E. HOLTUM,
Botanic Gardens, Singapore

When Kuhn published the original diagnosis of the genus *Teratophyllum* in 1869 he included in it the bipinnate species previously known as *Polybotrya articulata* J. Sm. and *Polybotrya Wilkesiana* Brack. These differ notably in several characters from the other species of the genus; so much so that when I prepared an account of *Teratophyllum* in 1932 (this Bulletin, vol. 5, pp. 277-304) I excluded them as possibly referable to a distinct genus. Copeland has included them in *Lomagramma*, but all known species of *Lomagramma* have characteristic features of spores and venation which are quite different from those of the two species in question (this Bulletin, Vol. 9, p. 194). I have now examined a number of specimens, and have come to the conclusion that the best treatment is to unite them to *Teratophyllum* as proposed by Kuhn. His diagnosis however omits a number of important points, and I have prepared a new one which includes what seem to me the essential features of the genus. The genus as so defined consists of two sections. The first and larger section comprises those species dealt with in my former paper; the second section has hitherto not received adequate description, and I give below as full an account of its species as the material at present available allows.

I am grateful to the authorities in charge of various herbaria for the loan of specimens, or for permission to examine specimens. The herbaria in question are cited as follows: Brisbane (Br.) British Museum (B.M.), Buitenzorg (B.), Kew (K.), Philippine National Herbarium (M.), Singapore (S.), U.S. National Herbarium (W.).

TERATOPHYLLUM Mett., emend. Holttum

Rhizoma paleis peltatis adpressis fugacibus squamosum, alte scandens, dorsiventræ, frondium duos vel plures ordines ferens. *Frondes* prope solum (bathyphylla) minores, multifformes; frondes superiores (acrophylla) majores, pinnatæ vel bipinnatæ. *Pinnæ* acrophyllorum omnes articulatæ pinnulæ articulatæ apicales exceptæ; venulæ pinnarum vel pinnularum steriliū liberæ, simplices vel furcatæ, ante marginem terminatæ, margines integræ vel serratæ, *pinnæ vel pinnulæ fertiles* plus minusve angustatæ, sæpe lineares, semper acrostichoideæ, nervatio earum plerumque venulis irregularibus supernumerariis sæpe anastomosantibus prope paginam inferiore aucta; *paraphyses* nullæ; *spora* perisporio vestitæ.

1. *Euteratophyllum*. *Rhizoma* tenue, frondes semper biseriatæ, acrophylla semper pinnata. Species typica: *Lomaria aculeata* Bl.

2. *Polyseriatæ*. *Rhizoma adultum crassius*, frondes *polyseriatæ*, acrophylla sterilia et fertilia sæpe bipinnata. Species typica: *Polybotrya articulata* J. Sm.

The section *Euteratophyllum* is confined, so far as at present known, to the Malaysian region, inclusive of the Philippines and New Guinea. The section *Polyseriatæ* does not occur west of Celebes, but extends into the Pacific as far as Tahiti, also northwards throughout the Philippines and southwards to Queensland.

Key to the section *Polyseriatæ*

Fertile pinnæ hardly more than 1 mm. broad *T. Brightiæ*

Fertile pinnæ much broader, or fertile fronds bipinnate

Sterile pinnules auricled on upper base *T. articulatum*

Sterile pinnules not auricled *T. Wilkesianum*

***Teratophyllum articulatum* (J. Sm.) Mett.** Kuhn in Ann. Mus.

Lugd. Bat. 4: 297. 1869.

Polybotrya articulata J. Sm. (nomen nudum) Journ. Bot. 3: 401. 1841.

Fêe, Hist. Acrost. 74, t. 37. 1845.

Lomagramma articulata Copel. Phil. Journ. Sci. 3C: 32. 1908.

Lomagramma bipinnata Copel. Phil. Journ. Sci. 11C: 114. 1916.

The type of this species is Cuming 296, from Leyte. I have seen specimens of this collection at Kew and from the U.S. National Herbarium. I have also examined the specimens listed below. I have not examined the type of Copeland's *Lomagramma bipinnata*, but from description it seems to fall well within the range of variation of the present species. The range of variation is considerable, and of the same character in widely separated countries. The essential features of the species may be summarised as follows.

Rhizome to 1 cm. diameter, longitudinally ridged, at first covered with small peltate lanceolate almost black scales with brown more or less fimbriate edges, smaller scales entirely brown.

Stipes to at least 25 cm. long; main rachis not winged, but 2-grooved above, scaly when young.

Fronds to about 80 cm. long and 30 cm. wide, with about 15 pairs of pinnæ; basal and apical pinnæ somewhat smaller than the rest.

Pinnæ to 20 cm. long and 3.5 cm. wide, with stalks up to 1 cm. long; pinnules about 20 pairs; pinna-rachis winged, the wing interrupted at the base of each pinnule and expanded into a narrow lamina at the apex of the pinna.

Sterile pinnules on short winged stalks about 1 mm. long, variable in size and shape, commonly about 18 mm. long and 7 mm. wide in the middle; upper base truncate, usually 7-8 mm. wide, forming a prominent auricle, sometimes a distinct basal lobe; lower base narrowly cuneate; both edges (except the base) obliquely toothed, the teeth not more than 1 mm. deep, one to each vein-ending; apex rounded or bluntly pointed; veins mostly forked, except the vein in the basal auricle or lobe which is pinnate; surfaces of fully expanded frond naked except for a few scales on the lower surface, mostly on the midrib, the larger scales sac-shaped.

Fertile pinnules on winged stalks 2 mm. long, about 4-7 mm. long and 1 mm. wide when dry, the upper base distinctly auricled, the apex rounded.

Young stages. One specimen examined shows the young stage of the plant, namely Clemens 1018 from Mindanao. The rhizome is very slender and has simply pinnate fronds to about 12 cm. long and 2.5 cm. wide; the fronds each have about 10 pairs of pinnæ and an apex consisting of a narrow lamina continuous with the rachis. The stipes are not more than 1 cm. long, and in all cases there are one or two basal unpaired pinnæ on the side of the rachis towards the base of the plant, the side of the rachis towards the apex of the plant being devoid of pinnæ (this is in agreement with some species of *Euteratophyllum*). The pinnæ are up to 12 mm. long and 7 mm. wide, the general shape like the pinnules of the acrophylls but the veins fewer and the teeth larger and rounded. The lower surfaces bear sac-shaped scales like those of the acrophylls.

This specimen evidently represents a young stage, and we have no definite information as to whether the fronds on it are normal bathyphylls, or whether such may be bipinnate on larger rhizomes. The resemblance to *T. aculeatum* is striking, but the shape of the pinnæ and the scales are characteristic of *T. articulatum*, and there can be no doubt that reference to the present species is correct.

A specimen from Celebes (part of Bünnemeijer 11138) may perhaps represent more normal bathyphylls. The fronds are small, bearing pinnules of hardly more than half the usual size, and are attached to a slender rhizome. In the same collection are fronds of normal size with larger pinnules.

Distribution: from Celebes and the Philippines through New Guinea to the Solomon Islands.

PHILIPPINES. *Leyte:* Cuming 296 (type collection, K., W.); Dagami, C. A. Wenzel 89 (M.). *Luzon:* Mt. Masingit, Lubuagan, Kalinga Subprov., Bur. Sci. 37500, Ramos and Edano (M., B.); Caraballo Mt., Nueva Vizcaya Prov., Bur. Sci. 13730, 13733, 13716, Loher (M.). *Mindanao:* Camp Keithley, Lake Lanao, M. S. Clemens 1073 (M.), 1018 (M.), s.n. (B.).

CELEBES. Lombasang, N. W. Celebes, Bünnemeijer 11138 (B.). Papepekang, Bonthain, Teysmann 13688 (B.). Mt. Bonthain, S. W. slope, 1500 m., Posthumus 2720 (S.). Prov. Minahassa, Koorders 17073 (B.), 17056 (B.), 17032 (B.).

CERAM. 1000-1400 m., Rutten 2213 (B.).

NEW GUINEA. Nassau Geb. 700 m., Docters van Leeuwen 10680 (B.). Boridi, Papua, 4,800 ft. Carr. 14212 (S.). K. Wilhelmsland, Wapao, 600 m., Bamler (Rosenstock, Fil. Novoguin. 122, M.).

SOLOMON ISLANDS. Bougainville, 1600 m., Kajewski 1711 (M.), 1200 m., Kajewski 2669 (M.).

Teratophyllum Brightiæ (F. von Muell.) Holttum comb. nov.
Plate 28.

Acrostichum Brightiæ F. von Mueller, Fragmenta 7: 119. 1870.

The original description of this species is as follows:—

Alte scandens, frondibus simpliciter pinnatis, rachi aptera, *pinnis cum rachi articulatis, sterilibus fere conformibus membraneis perangusto-vel falcato-lanceolatis conspicue petiolulatis ad basin fere cuneatam inæquilateris tenui-acuminatis irregulariter repando-crenulatis subtus pallide virentibus, venis tenuibus multis inferne longiuscule simplicibus superne dicladis, apicibus venarum fere clavato-incrassatis ante marginem evanescentibus*, rachi frondis fertilis squamulis angustis acutis crispulis conspersa, pinnis anguste linearibus remotiusculis.

In monte Grahami prope Rockingham's Bay; J. Dallachy.

Caudex ad altitudinem 20' scandens, angulosus, superne semipollicem crassus. Rachis frondis sterilis fere nuda. Pinnæ steriles 3-5" longæ, 4-7" latæ; fertiles vix semilinea latiores. Sporangia flavida.

By the courtesy of Mr. C. T. White, I have examined a number of specimens from the Queensland Herbarium (Brisbane), and can add the following particulars to von Mueller's description.

Rhizome. The acrophyll-bearing rhizome may have at least four leaf-gaps. The bathyphyll-bearing rhizome has usually two leaf-gaps as in *Eu-teratophyllum*. One specimen shows a stout old rhizome bearing bathyphylls on young lateral branches; apparently this rhizome had fallen and was starting new growth again from its fallen position.

Bathyphylls. These are fully represented in the Brisbane collections. They vary a good deal in size, the largest approaching the smallest acrophylls in size of pinnæ. They differ constantly from the acrophylls in (1) the apex of the frond, which consists of a narrow toothed lamina, its midrib continuous with the rachis, and (2) the broadly truncate or even subauriculate upper base of the pinnæ. The smaller bathyphylls show a decided resemblance to the young stage of *T. articulatum* described above, or to pinnæ of acrophylls of *T. articulatum*.